

Project Report

PUDDING CREEK

SEWER FORCEMAIN RELOCATION PROJECT

Agreement No. 07-573-550-0 CBI No. 506
Clean Beaches Initiative Grant Program
State Water Resources Control Board
Division of Financial Assistance

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Description of Project

Introduction

Pudding Creek watershed is located north of the Noyo River Watershed, and consists of a distinct drainage basin. The basin includes approximately 8% of the Noyo Hydrologic Sub Area. The creek forms the northern perimeter of residential Fort Bragg, and is the source of industrial water for the former GP Mill Site.

The creek enters the Pacific Ocean at Pudding Creek Beach. Pudding Creek Beach is one of two public beaches within the City limits and is part of MacKerricher State Park. It is a popular site for recreation on the protected sandy beach along the lagoon. It is favored by families with small children because the access road brings visitors within easy reach of the water and a sandy beach. Activities can include wading in the lagoon, picnicking, volleyball, bird watching, tide pool exploration, photography, "en plein air" painting, walking the rocky shoreline, surfing, and chasing waves in the surf.



Figure 1. The wave run-up zone at Pudding Creek Beach

The lagoon area can be characterized as an enclosed lagoon during the dry weather season. Without the flushing action generated by winter storm events, high flows in the creek, and large waves in the ocean, a sand berm forms at the outlet of the creek to the Pacific Ocean. The berm is typically in place during the summer and fall months, and is breached during the first significant rain event. The formation of the berm impacts water circulation and limits tidal influence in the lagoon.

Besides being a popular spot for recreation, the lagoon at the mouth of the creek is important habitat for wildlife, including the tide water goby (*Eucyclogobius newberryi*, Federal Status:

Endangered). Pudding Creek is historically known to produce coho salmon (*Oncorhynchus kisutch*). Both the US Fish and Wildlife Service and California Department of Fish and Game perform fish surveys and studies in the lagoon at Pudding Creek.



Figure 2. 2009 US Fish and Wildlife Service Tidewater Goby Survey in south Pudding Creek Lagoon

The Fort Bragg Municipal Improvement District No. 1 serves an area approximately two miles square in and around the City of Fort Bragg. Fort Bragg is a small coastal town in Northern California dependent on a tourism-based economy after the recent decline of its industrial and natural resources economy.

The sewer forcemain connects the lift station at Pudding Creek to the gravity sewer collection system in central Fort Bragg. Wastewater from MacKerricher State Park, six motels and the light industrial users on the north end of Fort Bragg is collected at the lift station and pumped south from Pudding Creek to the nearest manhole in West Elm Street.

Project Summary

Sewer Forcemain Background

Pudding Creek forms the City northern boundary for much of Fort Bragg. The creek empties into the Pacific Ocean at Pudding Creek Beach. This beach is used by residents and visitors, providing a sheltered lagoon area as well as ocean beach.

Much of the sewer forcemain that serves the northern coastal along Pudding Creek Beach was installed in 1973-74 as part of the Pudding Creek Interceptor Project. In 1985, the Fort Bragg Municipal Improvement District No. 1 (MID) replaced 450 feet of pipeline across the creek adjacent to the Pudding Creek Bridge on State Route 1.

During high flows in the creek during a January 2006 storm event, the forcemain was scoured from the bottom of the creek and floated to the surface. Under an emergency repair contract and funding from the Office of Emergency Services, the forcemain was re-anchored to the bottom of the creek using stainless steel anchors and straps.

The existing sewer forcemain crossing Pudding Creek Beach ruptured four times since 2005, including three times in 2006. Abrasion by rocks and roots in the pipe trench has worn holes through the pipe wall. Spills of untreated sanitary sewage occurred on the dunes near the lagoon.

On April 26, 2007, the Regional Board adopted Cease and Desist Order (CDO) No. R1-2007-0015 for the Fort Bragg Municipal Improvement District No. 1, (FBMID) and this order contained requirements to investigate, design and implement facility upgrades to repair the Pudding Creek Forcemain.

As the local fishing and timber industry has declined, the City of Fort Bragg has become increasingly reliant on a tourist-based economy. Pudding Creek Beach offers ease of access, proximity to Highway 1, sheltered swimming areas, and access to the Coastal Trail. As a result, it is the most heavily utilized public beach on the North Coast. Because of its proximity to the City of Fort Bragg, the beach area is an important attraction to out-of-area visitors as well as to local residents, all of whom bring economic benefits to the City. Beach closures due to sewage spills would have a devastating impact on the Pudding Creek habitat and would result in negative impact on the area's economy.

Project Purpose

This project relocated and replaced approximately 3,000 LF of 10-in sewer forcemain from the Pudding Creek Lift Station to the nearest manhole on Elm Street. The forcemain is now located along the frontage road at Pudding Creek Beach and on the west side of State Route 1 and Pudding Creek Bridge. Replacement pipe consists of buried thick-walled HDPE pipe (SDR 11) and double-walled ductile iron and welded steel pipe crossing Pudding Creek Bridge. Replacement and relocation of the sewer forcemain protects the beach and dunes areas from catastrophic spillage of untreated wastewater. Our goal was to move the location of the forcemain away from the beach and replace it with stronger pipe material that will protect water quality at Pudding Creek Beach. Replacement of the old forcemain minimizes the risk of further spills of sewage on the beach and dunes area adjacent to Pudding Creek Beach.

Techniques Used

The contractor for the project followed the project specifications and used accepted construction practices for installation of the HDPE pipe, installation of the ductile iron forcemain and appurtenances, and welding of the steel outer pipe for the bridge crossing. The (MID) provided constant inspection and construction management by qualified professionals during the construction period. Materials Submittals were reviewed and approved by the design engineer at Wood Rogers.

The design engineer provided an operations and management manual for the MID for the new facility. On-going inspection and maintenance of the facility has been performed by certified operators and the Public Works maintenance crew.

Partners Involved

The old forcemain was located within MacKerricher State Park, and was relocated within Caltrans right of way adjacent to State Route 1. The forcemain also crosses Pudding Creek, which puts it within the sphere of the State Lands Commission. The forcemain serves the motels constructed within the northern part of Fort Bragg and the State campgrounds at MacKerricher State Park.



Figure 3. The State Park pedestrian trail over restored trestle bridge at Fort Bragg as seen from State Route 1

All of these agencies were part of the planning and permitting of the project, and benefited from the improvements. The MID worked with the Mendocino Region of the California State Parks to allow continued access to the park during construction. The MID also worked with Mendocino County Department of Environmental Health during the water quality monitoring. The County added three water sampling locations to their AB411 monitoring plan in order to assist the MID in meeting grant requirements. The project also included input from the California Coastal Commission and the North Coast Regional Water Quality Control Board.

Our design consultant went well beyond design of the forcemain and supported us with technical and administrative expertise through unexpected and challenging tasks, including a

lease application process with State Lands for the new location of the forcemain, and our encroachment permit with Caltrans that involved eleventh-hour redesign of the pipe line location and trench detail.

Pudding Creek lagoon and ocean beach is a significant visual resource, as well as important habitat. The MacKerricher bluff trail passes over the lagoon and beach area via the Pudding Creek Trestle. The trestle was restored by State Parks as a pedestrian and cyclists trail, and reopened in 2008. The trestle is the southern end of the State Park Trail, and will be the northern start of the City of Fort Bragg Mill trail on the former Georgia-Pacific mill property. This southern extension of the coastal trail is scheduled to be opened in late 2010.



Pudding Creek Trail Location Map

Fort Bragg Municipal Improvement District No. 1
Pudding Creek Force Main Relocation Project

Figure 4. Location of the existing public use trail and the trail extension planned on the headlands on the former GP mill site.

Monitoring and Management Practices

Construction of the Pudding Creek Forcemain Relocation project was completed in late 2008. The former forcemain was cleaned, plugged and abandoned per the construction contract. Effectiveness of the pipe relocation and upgrade can be measured by reduction/elimination of sewage overflow event reports. No spills have been reported since the project was completed.

Operators from the MID have performed regular operations and maintenance procedures at the sewer lift station at Pudding Creek, including visual inspections of the pipeline route. The public works crew has opened the ports on the double-walled pipe crossing the Pudding Creek Bridge to make a visual check on conditions inside the outer pipe on the bridge to verify that no leaks were present. The expected lifetime of the pipe exceeds 20 years.

Project Initiation and Culmination

When spills of raw wastewater occurred along the sewer forcemain at Pudding Creek Beach during June 2006 and August of 2006, the City of Fort Bragg Engineering Division, acting for Fort Bragg Municipal Improvement District No. 1 (MID), began seeking all available funding sources to replace the forcemain, including the Office Of Emergency Services Hazard Mitigation Program funding for relocating the forcemain out of the Special Flood Hazard Area, the Small Community Wastewater Grant funding for improvements to the sewer collection system, and Proposition 50 Clean Beaches Initiative funding to protect the water quality at Pudding Creek Beach.

The wastewater spills occurred in the dunes area close to the sandy beach, but did not reach open water. The causes appeared to be weaknesses in the old sewer forcemain. The old pipe consisted of a thin-walled HDPE material. Debris in the trench backfill material scraped holes in the outside of the pipe during the expansion and contraction of the pipe during pumping. The pipe also split longitudinally assumed to be due to material fatigue.

An additional concern to the MID and the City of Fort Bragg was the old sewer forcemain crossing located under the Pudding Creek streambed. During high stream flows in the winter, erosion of the streambed in Pudding Creek exposes a short length of pipe on each bank of the creek. The Regional Water Board was concerned that floating debris would snag the pipeline and damage the pipe causing a catastrophic spill in the creek (see cover for "before" photo of uncovered forcemain).

On January 29, 2007, the MID was issued a Cleanup and Abatement Order No. R1-2007-001 from the North Coast Regional Water Quality Control Board to permanently eliminate future discharges of unauthorized waste to Pudding Creek.

On January 31, 2007, the MID applied for a grant for the Clean Beaches Grant Program to relocate the sewer forcemain that was located in the dunes area adjacent to Pudding Creek. The project goal was to stop sewer spills from the worn-out pipeline and elevate the pipe out of the creek.

Engineering for the relocated pipeline was started in February of 2008. Plans were submitted to the reviewing agencies in April of 2008. A right of entry agreement for work within the California State Park Lands was signed in June of 2008. An encroachment permit was issued by Caltrans for work within their right of way in August 2008. The State Lands Commission issued a permit for work within horizontal boundaries of the Creek in August 2008. The Coastal Commission

issued a permit for the work in September 2008. Bids for construction were received on August 4, 2008 and construction was started on September 8, 2008. North Bay Construction of Petaluma was the contractor selected to do the work.

The City of Fort Bragg completed the environmental review and CEQA documents in-house, and hired an engineering design consultant to prepare the project plans and specifications. Permitting was also managed in-house. The construction project was awarded to North Bay Construction and began in August of 2008. Approximately 2,500 linear feet of ten-inch HDPE pipeline and 370 linear feet of steel-encased ductile iron pipeline were constructed. Construction management and inspection was completed by the same engineering design firm.

No sewer spills have occurred since the new forcemain has been in service. The development of working relationships between the MID, the State Water Board, California State Parks, and the Mendocino County Health Department has enhanced the success of the project based on common interests of protecting the public and preserving the resources at Pudding Creek Beach.



Figure 5. Pudding Creek Beach during a winter storm event

Project Monitoring and Reporting Plan

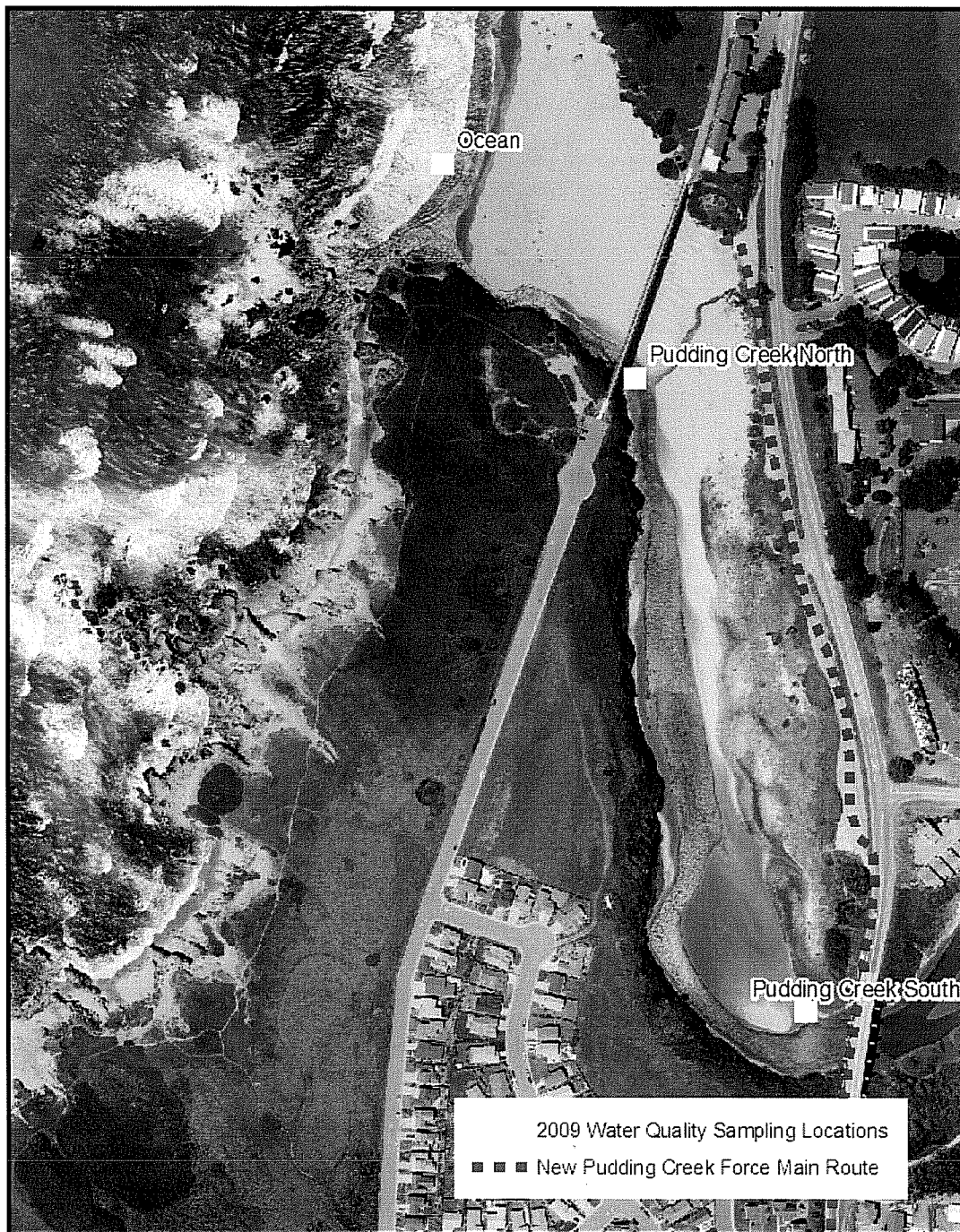
Water Quality Monitoring Goals

As a part of the grant agreement scope of work, the City collected water quality data from surface water at Pudding Creek Beach. This data was collected by Mendocino County Department of Environmental Health. The results of the sampling and testing are summarized in this report. Water quality samples were collected at two locations in Pudding Creek Lagoon and one location in the surf zone of the confluence with the Pacific Ocean at MacKerricher State Park (see the following map - "Water Quality Sampling Locations").

Mendocino County Department of Environmental Health regularly collects ocean water quality samples for their annual Assembly Bill 411 program. Samples are collected from April 1 to October 31. Beaches are posted when the samples exceed established bacterial concentration standards. In 2009, Mendocino County increased their AB 411 program sampling at the Pudding Creek location to include two locations in the lagoon area as well as the one ocean sample taken in the wave run up zone near the mouth of Pudding Creek.



Figure 6. Water Quality Sampling in Pudding Creek at the "Pudding Creek South" Location near the Pudding Creek Bridge by a specialist from the Mendocino County Division of Environmental Health



Water Quality Sampling Locations

Fort Bragg Municipal Improvement District No. 1
Pudding Creek Force Main Relocation Project

Figure 7. Monitoring Locations for 2009 water quality sampling at Pudding Creek Beach.

Bacteriological Standards

The results of the water samples were evaluated for exceedance of bacteriological standards according to California Code of Regulations, Title 17, Group 10 Sanitation "Healthfulness and Safety of Ocean Water-Contact Sports Areas, Article 4. Healthfulness", Section 7958.

"The minimum protective bacteriological standards for waters adjacent to public beaches and public water-contact sports areas shall be as follows:

(1) Based on a single sample, the density of bacteria in water from each sampling station at a public beach or public water contact sports area shall not exceed:

- (A) 1,000 total coliform bacteria per 100 milliliters, if the ratio of fecal/total coliform bacteria exceeds 0.1; or
- (B) 10,000 total coliform bacteria per 100 milliliters; or
- (C) 400 fecal coliform bacteria per 100 milliliters; or
- (D) 104 Enterococcus bacteria per 100 milliliters."

Frequency and Duration of Monitoring

Mendocino County Health Department Environmental Health Division performed the project monitoring as part of their AB 411 Sampling program. The monitoring program started on April 7, 2009, and continued through October 27, 2009. The sampling data was collected weekly at the three locations shown in the following map. The frequency and duration of the sampling was consistent with AB 411 criteria.

Monitoring program commenced in April 2009 and continued through October 2009. The sampling data was collected weekly at the three locations shown on the previous page. The frequency and duration of the sampling was consistent with AB411 requirements.

Testing Method

Mendocino County Department of Environmental Health had the samples tested using standard methods "Colilert-18" for total coliform, "Fecal Coliform" for fecal coliform, and "ELT Enterolert" for Enterococcus.

Project Results Preventing and Reducing Pollution

The change in sewer forcemain location and the use of specially selected materials and construction methods reduced the risk of environmental and health impacts to the Pudding Creek and the Pacific Ocean from sanitary sewage spills. The sewer forcemain relocation project was designed to remove the sewer forcemain from the Pudding Creek streambed, and separate it from the sensitive beach and dunes areas.

The sewer forcemain relocation and improvement project was also designed to prevent future sewage spills caused by failed pipe material, and to eliminate potential for damage to the forcemain due to erosion and contact with floating debris in Pudding Creek.

A surge analysis was performed to verify that the size and type of replacement piping would perform well under the expected pumping pressure gradients. The new HDPE pipe is protected from intrusion of roots and ground water by water-tight thermally-fused joints.

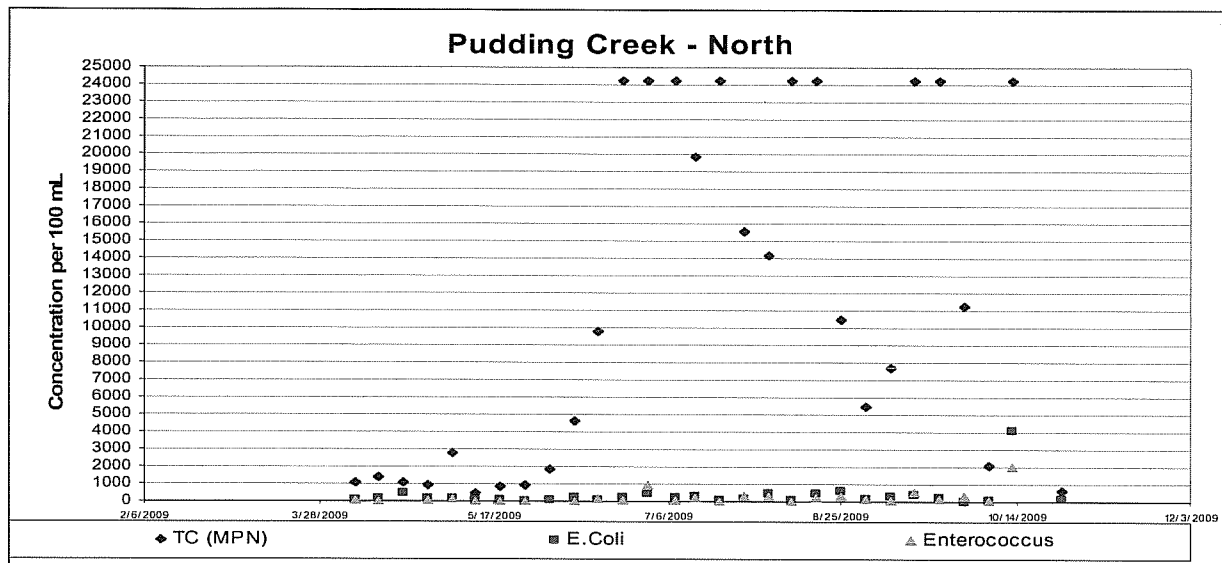


Figure 9 – The concentration of bacteria per 100 mL in the north sampling location at Pudding Creek Lagoon. TC is Total Coliform. E.Coli is fecal coliform

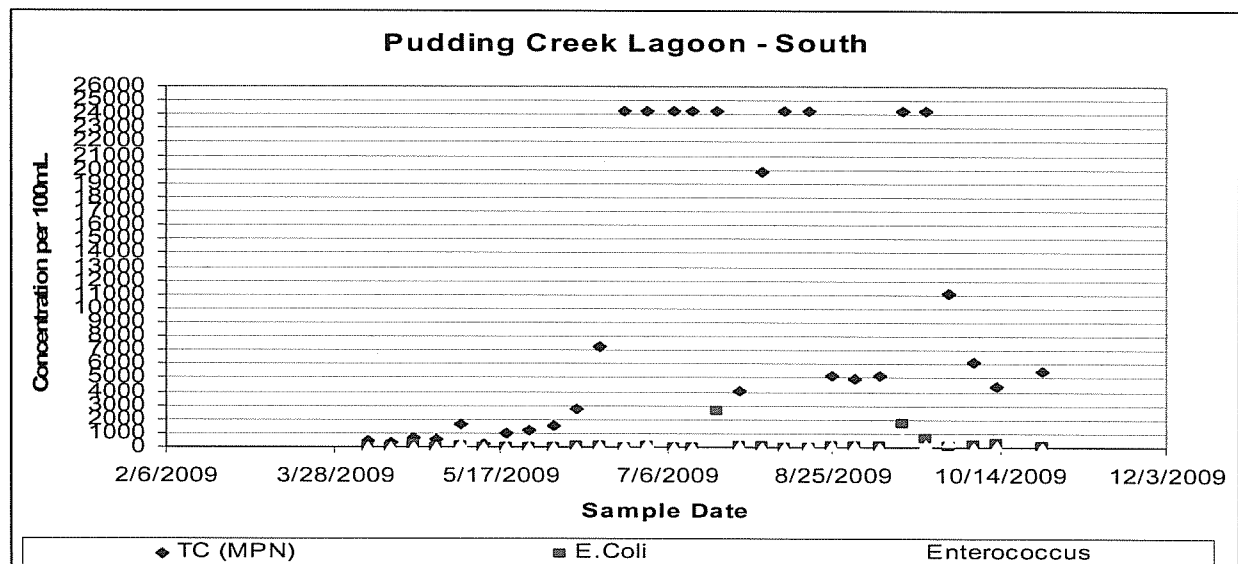


Figure 10 – The concentration of bacteria per 100 mL in the south sampling location at Pudding Creek Lagoon. TC is Total Coliform. E.Coli is fecal coliform

Exceedances

Concentrations of bacteria in the lagoon water exceeded water quality standards during the sampling period. The following table lists all of the exceedances in the Pudding Creek North sampling location. This location is adjacent to the popular sheltered beach, while the Pudding Creek South location is not used as heavily as the banks are vegetated.

Table 1. Dates of Exceedance of one or more bacteriological water quality standards at Pudding Creek North Sampling Site

Date Collected	TC	E.Coli	Enterococcus
Limit per 100 mL	10,000	1,000	104
4/21/2009	1076	488	
5/5/2009	2755	146	189
6/16/2009	9804	97	169
6/23/2009	24,196	213	52
6/30/2009	24,196	441	906
7/8/2009	24,196	259	41
7/14/2009	19,863	345	243
7/21/2009	24,196	63	31
7/28/2009	15,531	158	345
8/4/2009	14,136	480	317
8/11/2009	24,196	41	31
8/18/2009	24,196	487	218
8/25/2009	10,462	650	279
9/1/2009	5,475	121	132
9/15/2009	24,196	384	554
9/22/2009	24,196	199	148
9/29/2009	11,199	31	337
10/13/2009	24,196	4,106	2,014

These results resulting in posting of a health warning at the lagoon by the Mendocino Department of Environmental Health in coordination with State Parks.

A July 1, 2009, email to the MID regarding high elevations of bacteria in the lagoon from John Morley at Mendocino County Department of Environmental Health stated:

“Lab results are in. Second consecutive exceedance[sic]. High total coliform count, slightly elevated for E. coli. Please inform State Parks we will post an advisory to avoid contact with water at the beach.

This is not unexpected and I anticipate we will continue to get elevated readings due to wildlife and the characteristics of the lagoon being calm and relatively warm 60 - 65 degrees F. If water samples continue to exceed standard I encourage State Parks to consider a permanent posting at the location. “

Conclusions

Higher bacteriological concentrations appear to be associated with warm water and wildlife found in the lagoon at Pudding Creek. The recreational beneficial use for water contact may be incompatible with wildlife habitat, a protected beneficial use. Factors leading to poor water quality may also be associated with formation of a sand berm at the mouth of the creek at the wave run up zone. This berm forms annually and is typical of drainage basins along the coast when stream flow decreases during the dry season.

Other potential sources of bacteria should be investigated in order to verify that the concentrations of bacteria in the closed lagoon are “natural” and not human-caused. Although no data confirms the discharge of partially-treated wastewater from failed on-site systems upstream, or land-use activities that may be the source of bacteria in the lagoon, these possibilities need additional study.

As the goal of the project was to protect Pudding Creek beach and lagoon from continued untreated wastewater spills, the bacterial concentration exceedances found in the lagoon do not appear to reflect on the success or failure of the project.

Project Performance

Consistency with Project Assessment and Evaluation Plan (PAEP)

The following table was included in the PAEP submitted to the Clean Beaches Initiative Grant Program. The project goal was consistent with the PAEP. By preventing the overflows or spills of raw wastewater the targets were reached. Secondary goals included increased communication with local agencies, and initiation of a team effort to protect Pudding Creek Beach.

While water quality results in the lagoon area exceeded standards for water contact, the ocean beach showed consistently low concentrations of bacteria after the project was complete. The project did not appear to effect an improvement in the water quality in Pudding Creek lagoon as proposed. This indicates that the lagoon bacteriological concentrations may not have been related to the past failures of the old sewer forcemain.

Table 2. PAEP Summary

Project Goals	Ensuring that coastal waters adjacent to public beaches meet the bacteriological standards set forth in Article 2 (commencing with Section 115875) of Chapter 5 of Part 10 of Division 104 of the Health and Safety Code by preventing overflows of raw wastewater adjacent to the Pudding Creek Beach recreational area, part of MacKerricher State Park	Ongoing coordination with Mendocino County on the subject of Pudding Creek Beach water quality monitoring
Desired Outcomes	No spills from the sewer forcemain that connects the Pudding Creek Lift Station to the sewer collection system.	Share information and ideas regarding protection of the water quality at the City of Fort Bragg's primary public beach
Output Indicators	<p>LF of sewer forcemain relocated.</p> <p>Construction document approvals by City Engineer.</p> <p>Construction Inspector approval of methodology and workmanship.</p>	City of Fort Bragg, to receive water quality test results from total coliform, E. coli, and Enterococci present in grab samples from March to October.
Outcome Indicators	No overflow reports submitted to the agencies. Secondary indicator could include Mendocino County water quality test results from grab samples taken in the lagoon area and surf zone. These areas are downstream of the proposed location of the sewer forcemain.	Sharing information from water quality test results and visual observations
Measurement Tools and Methods	<p>Primary: Visual inspection and reporting.</p> <p>Secondary: Water Quality test results from total coliform, E. coli, and Enterococci present in monthly grab samples from March to October.</p>	Reporting of water quality test results reviewed by Public Works and information on file at City Hall Public Works.
Targets	<p>100% elimination of beach pollution from leaks in sewer forcemain</p> <p>Reduction of total coliform, E. coli and Enterococci in monthly grab samples from March to October</p>	Documentation of at least quarterly contact between City of Fort Bragg Public Works Dept. and Mendocino County Environmental Health Dept..

Benefits – Improved or Protected Beneficial Uses

The beneficial uses of Pudding Creek include industrial process supply; water contact recreation; non-contact water recreation; migration of aquatic organisms; spawning, reproduction and/or early development; cold fresh water habitat and rare, threatened and endangered species. The creek also supports populations of Coho salmon and Steelhead.

The threat of the discharge of raw wastewater to Pudding Creek has been minimized. All of the protected beneficial uses rely on protection from the threat of a wastewater spill.

Successes and Shortcomings

Replacement of aging infrastructure was the primary focus of the construction project. By placing this project within the frame work of the Clean Beaches Initiative Grant Program, the MID, the City of Fort Bragg, and the project partners had an opportunity to form a coalition to protect the beneficial uses of Pudding Creek Beach. This knowledge and awareness has set the tone for future projects in the area, including the development of the Coastal Trail.

Although the project succeeded in removing the threat of catastrophic degradation due to a raw wastewater spill, the water sampling and testing revealed that the lagoon may not be the safe swimming spot favored by residents and visitors, and instead may be more suitably managed as wildlife habitat. Though not necessarily seen as a short coming, the water quality results indicated that the public needs to be informed of the conditions in the lagoon that make it less desirable as a location for water contact uses.

Lessons Learned

What worked?

Coordination between the Clean Beaches staff and MID staff worked well. Clean Beaches staff met several times with the project team during the planning phase, and made a site visit that launched the project. The MID selected a skilled and detail-oriented design consultant who worked well with permitting agencies. MID staff gained the cooperation of competing interests by their hard work and win-win attitude. This project benefited greatly by the emphasis on engineering services during construction, including inspection and submittal review by the design consultant.

What didn't work?

Delays in permitting delayed the start of the construction period. These delays were not anticipated and could have had a fatal effect on the project due to the grant term limit. Considerable effort was need to coordinate with Caltrans regarding the encroachment permit, and last minute design changes required by Caltrans added to the last-minute rush. Despite these pitfalls, the project was constructed prior to the wet weather season.

What we learned that could be used elsewhere

The MID's efforts to include the State Parks Department early on in the planning process has increased the likelihood that the MID, the City of Fort Bragg and State Parks will value each other's input in the future. The "human" interest approach was successful in engaging all concerned.

1-5-10 WQ Testing Results

Location	Date Collected	TC (MPN)	E.Coli	Enterococcus
Limit		10,000		104
Ocean	4/7/2009	134	<10	<10
Ocean	4/14/2009	<10	<10	<10
Ocean	4/21/2009	<10	<10	<10
Ocean	4/28/2009	<10	<10	<10
Ocean	5/5/2009	85	<10	<10
Ocean	5/12/2009	85	<10	10
Ocean	5/19/2009	31	<10	<10
Ocean	5/26/2009	246	20	<10
Ocean	6/2/2009	134	<10	<10
Ocean	6/9/2009	959	<10	10
Ocean	6/16/2009	10	10	<10
Ocean	6/23/2009	10	10	<10
Ocean	6/30/2009			
Ocean	7/8/2009	10	<10	<10
Ocean	7/14/2009	10	<10	<10
Ocean	7/21/2009	20	10	<10
Ocean	7/28/2009	<10	<10	<10
Ocean	8/4/2009	31	10	<10
Ocean	8/11/2009	110	<10	<10
Ocean	8/18/2009	10	<10	<10
Ocean	8/25/2009	<10	<10	<10
Ocean	9/1/2009	10	<10	<10
Ocean	9/8/2009	20	<10	<10
Ocean	9/15/2009	<10	<10	<10
Ocean	9/22/2009	<10	<10	<10
Ocean	9/29/2009	10	10	<10
Ocean	10/6/2009	<10	<10	10
Ocean	10/13/2009	31	20	10
Ocean	10/27/2009	20	<10	<10
Pudding Creek Lagoon North	4/7/2009	1106	85	75
Pudding Creek Lagoon North	4/14/2009	1401	134	10
Pudding Creek Lagoon North	4/21/2009	1076	488	<10
Pudding Creek Lagoon North	4/28/2009	886	156	52
Pudding Creek Lagoon North	5/5/2009	2755	146	189
Pudding Creek Lagoon North	5/12/2009	457	40	20
Pudding Creek Lagoon North	5/19/2009	862	63	31
Pudding Creek Lagoon North	5/26/2009	908	31	20
Pudding Creek Lagoon North	6/2/2009	1860	85	<10
Pudding Creek Lagoon North	6/9/2009	4611	250	10
Pudding Creek Lagoon North	6/16/2009	9804	97	169
Pudding Creek Lagoon North	6/23/2009	>24,196	213	52
Pudding Creek Lagoon North	6/30/2009	>24,196	441	906
Pudding Creek Lagoon North	7/8/2009	>24,196	259	41
Pudding Creek Lagoon North	7/14/2009	19,863	345	243
Pudding Creek Lagoon North	7/21/2009	>24,196	63	31
Pudding Creek Lagoon North	7/28/2009	15,531	158	345
Pudding Creek Lagoon North	8/4/2009	14,136	480	317
Pudding Creek Lagoon North	8/11/2009	>24,196	41	31
Pudding Creek Lagoon North	8/18/2009	>24,196	487	218
Pudding Creek Lagoon North	8/25/2009	10,462	650	279

1-5-10 WQ Testing Results

Pudding Creek Lagoon North	9/1/2009	5,475	121	132
Pudding Creek Lagoon North	9/8/2009	7,701	281	41
Pudding Creek Lagoon North	9/15/2009	>24,196	384	554
Pudding Creek Lagoon North	9/22/2009	>24,196	199	148
Pudding Creek Lagoon North	9/29/2009	11,199	31	337
Pudding Creek Lagoon North	10/6/2009	2,046	97	52
Pudding Creek Lagoon North	10/13/2009	>24,196	4,106	2,014
Pudding Creek Lagoon North	10/27/2009	620	121	<10
Pudding Creek Lagoon South	4/7/2009	391	20	10
Pudding Creek Lagoon South	4/14/2009	318	41	20
Pudding Creek Lagoon South	4/21/2009	670	175	10
Pudding Creek Lagoon South	4/28/2009	583	31	10
Pudding Creek Lagoon South	5/5/2009	1664	109	173
Pudding Creek Lagoon South	5/12/2009	226	10	<10
Pudding Creek Lagoon South	5/19/2009	988	20	10
Pudding Creek Lagoon South	5/26/2009	1259	10	20
Pudding Creek Lagoon South	6/2/2009	1565	10	10
Pudding Creek Lagoon South	6/9/2009	2723	63	<10
Pudding Creek Lagoon South	6/16/2009	7270	63	86
Pudding Creek Lagoon South	6/23/2009	>24,196	52	135
Pudding Creek Lagoon South	6/30/2009	>24,196	134	201
Pudding Creek Lagoon South	7/8/2009	>24,196	41	<10
Pudding Creek Lagoon South	7/14/2009	>24,196	10	52
Pudding Creek Lagoon South	7/21/2009	>24,196	2,613	1,421
Pudding Creek Lagoon South	7/28/2009	4,106	109	97
Pudding Creek Lagoon South	8/4/2009	19,863	134	52
Pudding Creek Lagoon South	8/11/2009	>24,196	10	10
Pudding Creek Lagoon South	8/18/2009	>24,196	51	109
Pudding Creek Lagoon South	8/25/2009	5,172	132	86
Pudding Creek Lagoon South	9/1/2009	4,884	160	146
Pudding Creek Lagoon South	9/8/2009	5,172	135	20
Pudding Creek Lagoon South	9/15/2009	>24,196	1,723	657
Pudding Creek Lagoon South	9/22/2009	>24,196	670	233
Pudding Creek Lagoon South	9/29/2009	11,119	84	464
Pudding Creek Lagoon South	10/6/2009	6,131	256	30
Pudding Creek Lagoon South	10/13/2009	4,352	364	158
Pudding Creek Lagoon South	10/27/2009	5,475	85	20